

WHAT IS CLAIMED IS:

1. A high-output multi-mode mobile communication transceiver comprising:

5 a multi-mode mobile communication transceiver used in common for a plurality of communication modes including at least an AMPS mode; and

a booster connectable with said multi-mode mobile communication transceiver,

10 said multi-mode mobile communication transceiver comprising:

a transmission circuit configured to output at least transmission signals of the AMPS mode; and

a reception circuit configured to receive at least  
15 reception signals of the AMPS mode,

said booster comprising:

a first terminal through which signals in the booster are connected with a first antenna;

a power amplifier circuit connected with the first  
20 terminal; and

a reception-signal sending circuit connected with the first terminal,

wherein, when said booster is attached to said multi-mode mobile communication transceiver, the transmission  
25 circuit is connected in series with the power amplifier circuit, and the reception-signal sending circuit is connected in series with the reception circuit.

2. A high-output multi-mode mobile communication transceiver according to claim 1, wherein:

said booster further comprises a second terminal connected with an input terminal of the power amplifier circuit, and a third terminal connected with the reception-signal sending circuit;

said multi-mode mobile communication transceiver further comprises a fourth terminal through which signals in the transceiver are connected with a second antenna, a fifth terminal connectable with the second terminal, a sixth terminal connectable with the third terminal, a first switch that switches the transmission signals output from the transmission circuit to the fourth terminal or the fifth terminal to output the transmission signals, and a second switch that switches the reception signals input into the fourth terminal or the sixth terminal to the reception circuit; and

when said booster is connected with said multi-mode mobile communication transceiver, the second terminal is connected with the fifth terminal, and the third terminal is connected with the sixth terminal.

3. A high-output multi-mode mobile communication transceiver according to claim 2, wherein, when an output terminal of the transmission circuit is connected with the fourth terminal by the first switch, an input terminal of the reception circuit is connected with the fourth terminal by the second switch.

4. A high-output multi-mode mobile communication transceiver according to claim 2, wherein said booster further comprises a duplexer that connects an output terminal  
5 of the power amplifier circuit and the reception-signal sending circuit with the first terminal, and the reception-signal sending circuit contains a series circuit having a low-noise amplifier circuit and a variable attenuator.

10 5. A high-output multi-mode mobile communication transceiver according to claim 1, wherein said multi-mode mobile communication transceiver further comprises another transmission circuit configured to output transmission signals of at least a mode different from the AMPS mode and  
15 another reception circuit configured to receive reception signals of the mode different from the AMPS mode.

6. A high-output multi-mode mobile communication transceiver according to claim 5, wherein the other  
20 transmission and reception circuits remain unconnected with the booster circuit no matter the position of the first and second switches.

7. A high-output multi-mode mobile communication  
25 transceiver according to claim 1, wherein the transmission circuit is configured to output transmission signals of at least a mode different from the AMPS mode and the reception circuit is configured to receive reception signals of the

mode different from the AMPS mode.

8. A high-output multi-mode mobile communication transceiver according to claim 1, wherein the multi-mode  
5 mobile communication transceiver and the booster are encased in a portable housing.

9. A high-output multi-mode mobile communication transceiver according to claim 4, wherein the variable  
10 attenuator is disposed more proximate to the third terminal than the low-noise amplifier circuit, and the reception-signal sending circuit compensates for insertion loss of the duplexer.

15 10. A high-output multi-mode mobile communication transceiver according to claim 1, further comprising a baseband processing circuit configured to output control signals that change operation of the transmission circuit, the reception circuit, and a state of connection between both  
20 the transmission and reception circuits and the booster circuit.

11. A high-output multi-mode mobile communication transceiver comprising:  
25 a multi-mode mobile communication transceiver;  
a booster connectable with the multi-mode mobile communication transceiver; and  
a portable housing containing the multi-mode mobile

communication transceiver and the booster,

the multi-mode mobile communication transceiver  
comprising:

a transmission circuit configured to output  
5 transmission signals of a plurality of modes;

a reception circuit configured to receive reception  
signals of the plurality of modes; and

a first switch controlling connection between the  
transmission circuit and the booster and a second switch  
10 controlling connection between the reception circuit and the  
booster,

the booster comprising:

a first terminal through which signals in the  
booster are connected with a first antenna;

15 a power amplifier circuit connected with the first  
terminal; and

a reception-signal sending circuit connected with  
the first terminal,

wherein the transmission circuit is connected in series  
20 with the power amplifier circuit and the reception-signal  
sending circuit is connected in series with the reception  
circuit when the first and second switches are switched such  
that the booster and the multi-mode mobile communication  
transceiver are connected, and the booster and the multi-mode  
25 mobile communication transceiver are connected for signals of  
at least one but fewer than all of the plurality of modes.

12. A high-output multi-mode mobile communication

transceiver according to claim 11, wherein:

the booster further comprises a second terminal connected with an input terminal of the power amplifier circuit, and a third terminal connected with the reception-  
5 signal sending circuit;

the multi-mode mobile communication transceiver further comprises a fourth terminal through which signals other than those of the at least one mode are connected with a second antenna, a fifth terminal connectable with the second  
10 terminal, a sixth terminal connectable with the third terminal, the first switch switches the transmission signals output from the transmission circuit to the fourth terminal or the fifth terminal to output the transmission signals, and the second switch switches the reception signals input into  
15 the fourth terminal or the sixth terminal to the reception circuit; and

when the booster is connected with the multi-mode mobile communication transceiver, the second terminal is connected with the fifth terminal, and the third terminal is connected  
20 with the sixth terminal.

13. A high-output multi-mode mobile communication transceiver according to claim 12, wherein, when an output terminal of the transmission circuit is connected with the  
25 fourth terminal by the first switch, an input terminal of the reception circuit is connected with the fourth terminal by the second switch.

14. A high-output multi-mode mobile communication transceiver according to claim 12, wherein the booster further comprises a duplexer that connects an output terminal of the power amplifier circuit and the reception-signal  
5 sending circuit to the first terminal, and the reception-signal sending circuit contains a series circuit having a low-noise amplifier circuit and a variable attenuator.

15. A high-output multi-mode mobile communication  
10 transceiver according to claim 11, wherein the multi-mode mobile communication transceiver further comprises another transmission circuit configured to output transmission signals of at least a mode of the plurality of modes that is different from the at least one mode and another reception  
15 circuit configured to receive reception signals of the mode different from the at least one mode.

16. A high-output multi-mode mobile communication transceiver according to claim 15, wherein the other  
20 transmission and reception circuits remain unconnected with the booster circuit no matter the position of the first and second switches.

17. A high-output multi-mode mobile communication  
25 transceiver according to claim 11, wherein the transmission circuit is configured to output transmission signals of at least a mode of the plurality of modes that is different from the at least one mode and the reception circuit is configured

to receive reception signals of the mode different from the  
at least one mode.

18. A high-output multi-mode mobile communication  
5 transceiver according to claim 11, wherein the transmission  
and reception circuits are connected with the booster circuit  
for signals of only one mode of the plurality of modes.

19. A high-output multi-mode mobile communication  
10 transceiver according to claim 14, wherein the variable  
attenuator is disposed more proximate to the third terminal  
than the low-noise amplifier circuit and the reception-signal  
sending circuit compensates for insertion loss of the  
duplexer.

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20. A high-output multi-mode mobile communication  
transceiver according to claim 11, further comprising a  
baseband processing circuit configured to output control  
signals that change operation of the transmission circuit,  
20 the reception circuit, and the first and second switches.

21. A high-output multi-mode mobile communication  
transceiver according to claim 11, wherein only a single  
transceiver is used for signals required to be output in  
25 different power classes at different times.

22. A method of communicating comprising:  
transmitting transmission signals of a plurality of



modes using a transmission circuit;

receiving reception signals of the plurality of modes  
using a reception circuit;

boosting a first set of signals of at least one but  
5 fewer than all of the plurality of modes using a booster;

connecting the transmission circuit with the booster  
using a first switch and the reception circuit with the  
booster using a second switch the first set of signals,

amplifying the first set of signals in the booster using  
10 a power amplifier circuit, which is series connected with the  
transmission circuit;

communicating the first set of signals using a first  
antenna connected with a first terminal of the booster; and

transmitting the first set of signals through a  
15 reception-signal sending circuit connected with the first  
terminal to the reception circuit, which is series connected  
with the reception-signal sending circuit.

23. A method according to claim 22, wherein:

20 the booster further comprises a second terminal  
connected with an input terminal of the power amplifier  
circuit, and a third terminal connected with the reception-  
signal sending circuit,

the multi-mode mobile communication transceiver further  
25 comprises a fourth terminal, a fifth terminal connectable  
with the second terminal, and a sixth terminal connectable  
with the third terminal, and

the method further comprises:

switching the first switch such that transmission signals are output from the transmission circuit to the fourth terminal or the fifth terminal to output the transmission signals, and the second switch such that the  
5 reception signals are input into the fourth terminal or the sixth terminal to the reception circuits,

connecting the second terminal with the fifth terminal and the third terminal with the sixth terminal when the booster is connected with the multi-mode mobile communication  
10 transceiver, and

communicating signals other than the first set of signals externally using a second antenna connected with the fourth terminal.

15 24. A method according to claim 23, further comprising connecting at the same time both an output terminal of the transmission circuit with the fourth terminal by the first switch and an input terminal of the reception circuit with the fourth terminal by the second switch.

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25. A method according to claim 23, further comprising:  
duplexing an output terminal of the power amplifier circuit and the reception-signal sending circuit with the first terminal using a duplexer in the booster; and

25 compensating for insertion loss of the duplexer using a series circuit in the reception-signal sending circuit, the series circuit containing a low-noise amplifier circuit and a variable attenuator.

26. A method according to claim 22, further comprising:  
outputting transmission signals of at least a mode that  
is different from the at least one mode using another  
5 transmission circuit; and

receiving reception signals of the mode that is  
different from the at least one mode using another reception  
circuit.

10 27. A method according to claim 26, further comprising  
leaving the other transmission and reception circuits  
unconnected with the booster circuit no matter the position  
of the first and second switches.

15 28. A method according to claim 22, further comprising  
outputting transmission signals of at least a mode that  
is different from the at least one mode using the  
transmission circuit; and

receiving reception signals of the mode that is  
20 different from the at least one mode using the reception  
circuit.

29. A method according to claim 22, further comprising  
connecting the transmission and reception circuits with the  
25 booster circuit for signals of only one mode.

30. A method according to claim 22, wherein the multi-  
mode mobile communication transceiver and the booster are

encased in a portable housing.

31. A method according to claim 22, further comprising  
using only a single transceiver for signals required to be  
5 output in different power classes at different times.